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Lundeen

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(54) **ANTENNA SUPPORT BRACKET**

(75) Inventor: **Eric John Lundeen**, Seattle, WA (US)

(73) Assignee: **THE BOEING COMPANY**, Chicago, IL (US)

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(22) Filed: **Oct. 6, 2010**

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H01Q 1/12	(2006.01)
B64C 1/36	(2006.01)

(52) **U.S. Cl.**

CPC ***H01Q 1/1214*** (2013.01); ***H01Q 1/286*** (2013.01); *Y10T 29/49826* (2015.01); *B64C 1/36* (2013.01); ***H01Q 1/28*** (2013.01)

(58) **Field of Classification Search**

CPC H01Q 1/28; H01Q 1/286; H01Q 1/32; H01Q 1/3275; H01Q 1/1214; B64C 1/36

USPC 343/705, 885, 892, 703; 248/205.1, 248/220.21

See application file for complete search history.

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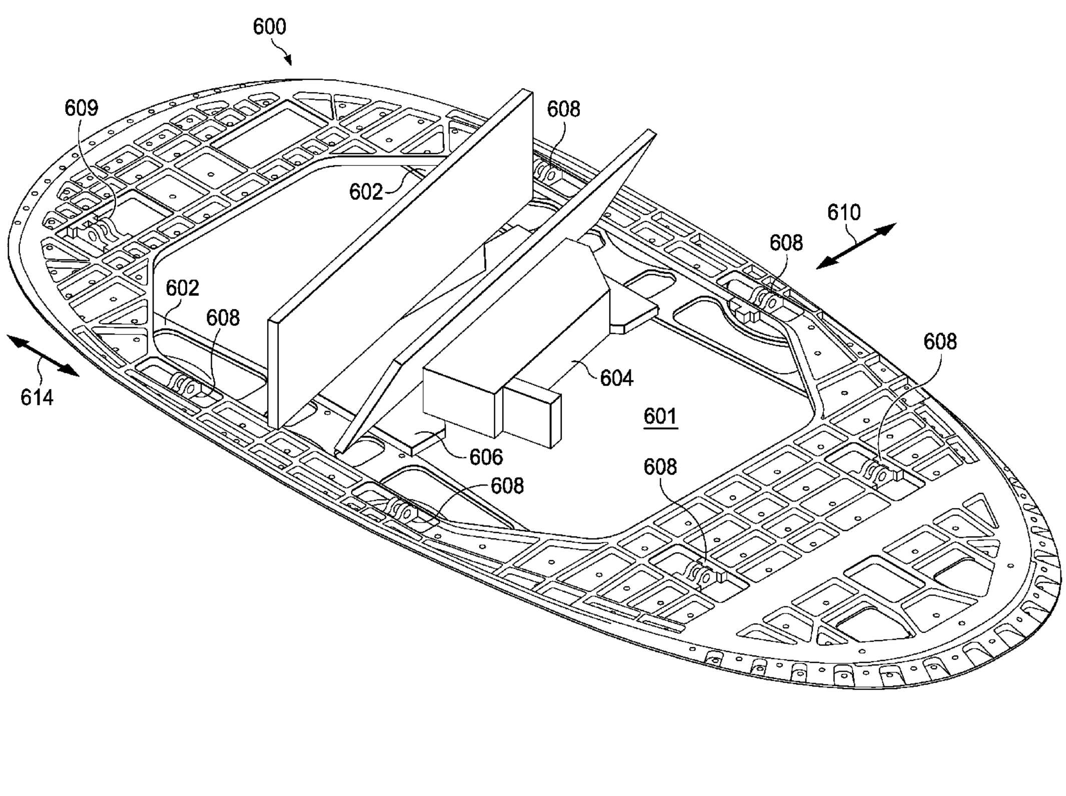
Primary Examiner — Dameon E Levi
Assistant Examiner — Jennifer F Hu
(74) *Attorney, Agent, or Firm* — Yee & Associates, P.C.

(57) **ABSTRACT**

A method and apparatus comprising a planar member and a number of support members. The planar member may be configured to be attached to an airframe of an aircraft. The number of support members may be configured to connect the number of antennas to the planar member.

14 Claims, 7 Drawing Sheets



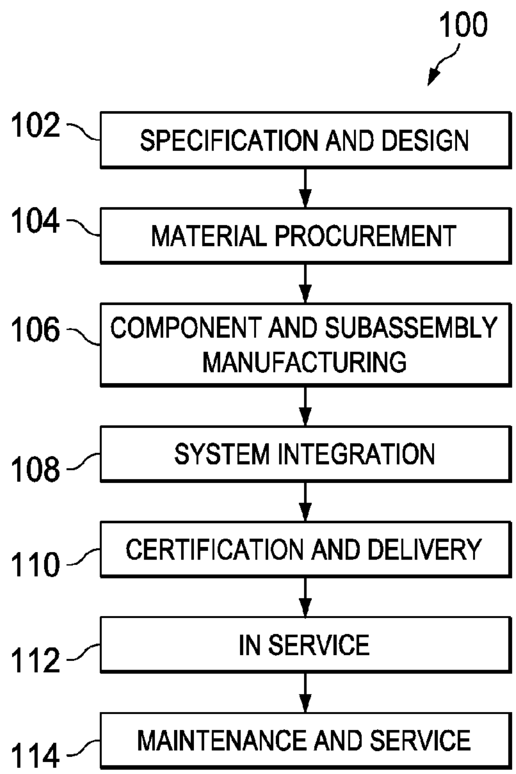

100
102
SPECIFICATION AND DESIGN
104
MATERIAL PROCUREMENT
106
COMPONENT AND SUBASSEMBLY MANUFACTURING
108
SYSTEM INTEGRATION
110
CERTIFICATION AND DELIVERY
112
IN SERVICE
114
MAINTENANCE AND SERVICE

FIG. 1

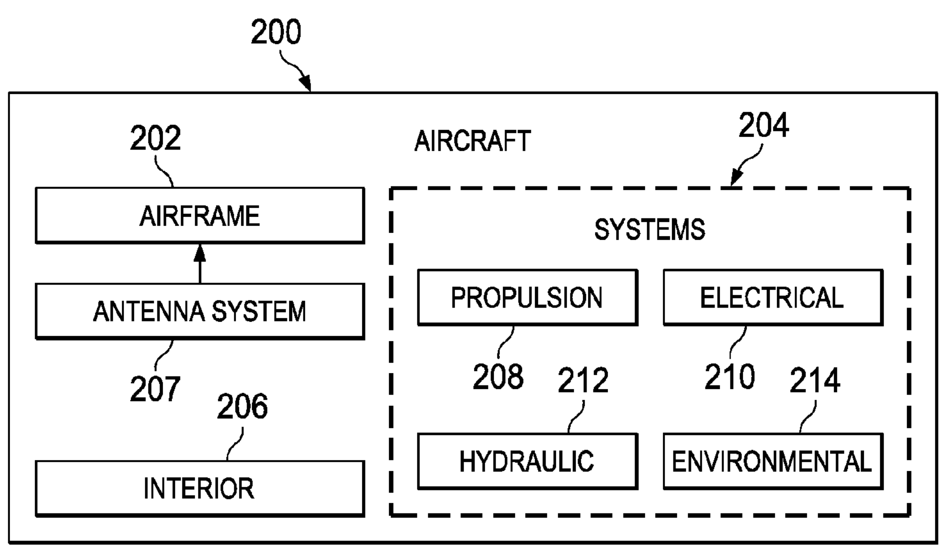

200
AIRCRAFT
202
AIRFRAME
ANTENNA SYSTEM
207
206
INTERIOR
204
SYSTEMS
PROPULSION
ELECTRICAL
208
212
210
214
HYDRAULIC
ENVIRONMENTAL

FIG. 2

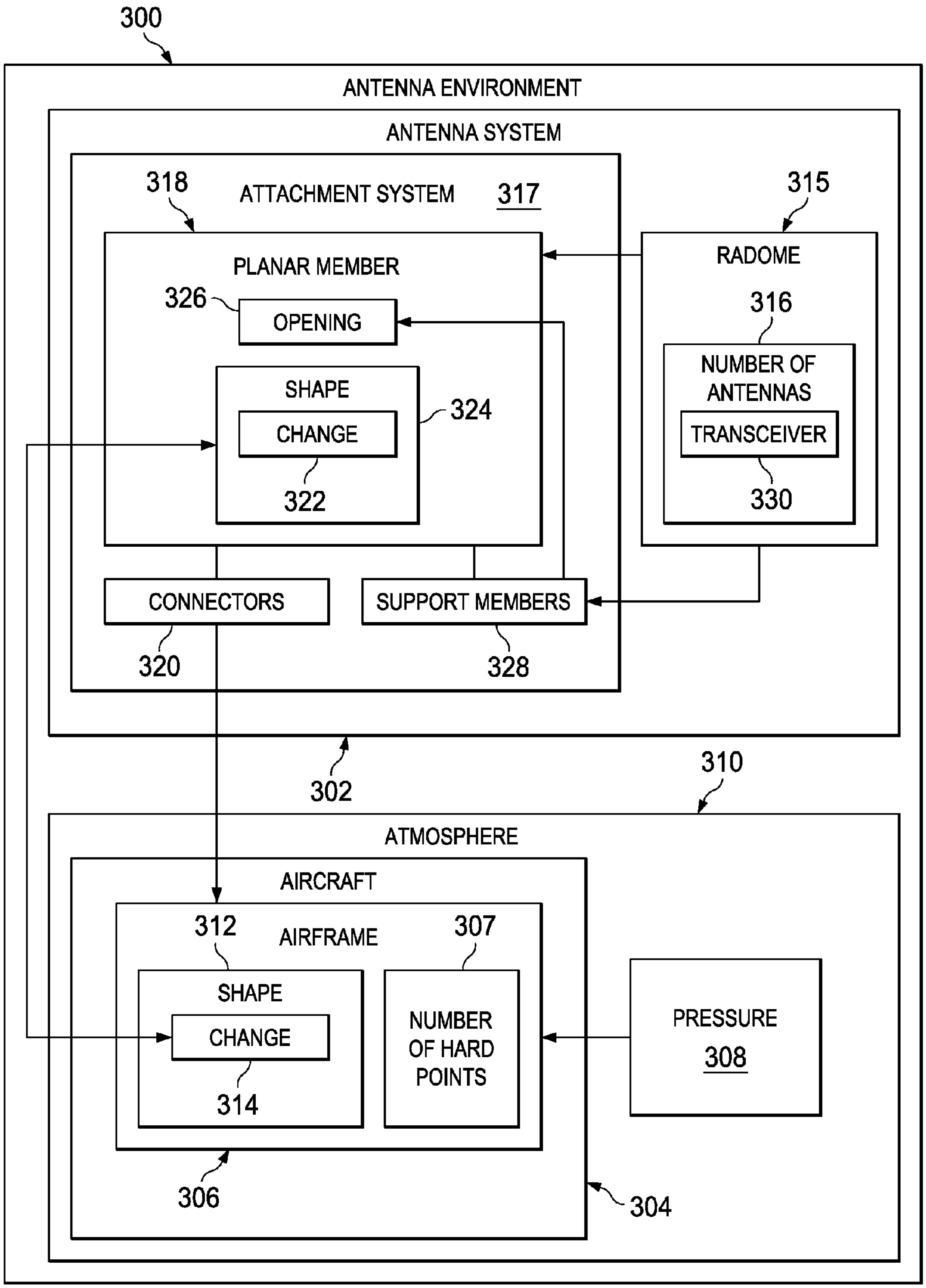

300
ANTENNA ENVIRONMENT
ANTENNA SYSTEM
318
ATTACHMENT SYSTEM
317
315
PLANAR MEMBER
RADOME
326
OPENING
316
SHAPE
324
NUMBER OF ANTENNAS
CHANGE
TRANSCEIVER
322
330
CONNECTORS
SUPPORT MEMBERS
320
328
302
310
ATMOSPHERE
AIRCRAFT
312
AIRFRAME
307
SHAPE
NUMBER OF HARD POINTS
PRESSURE
308
CHANGE
314
306
304

FIG. 3

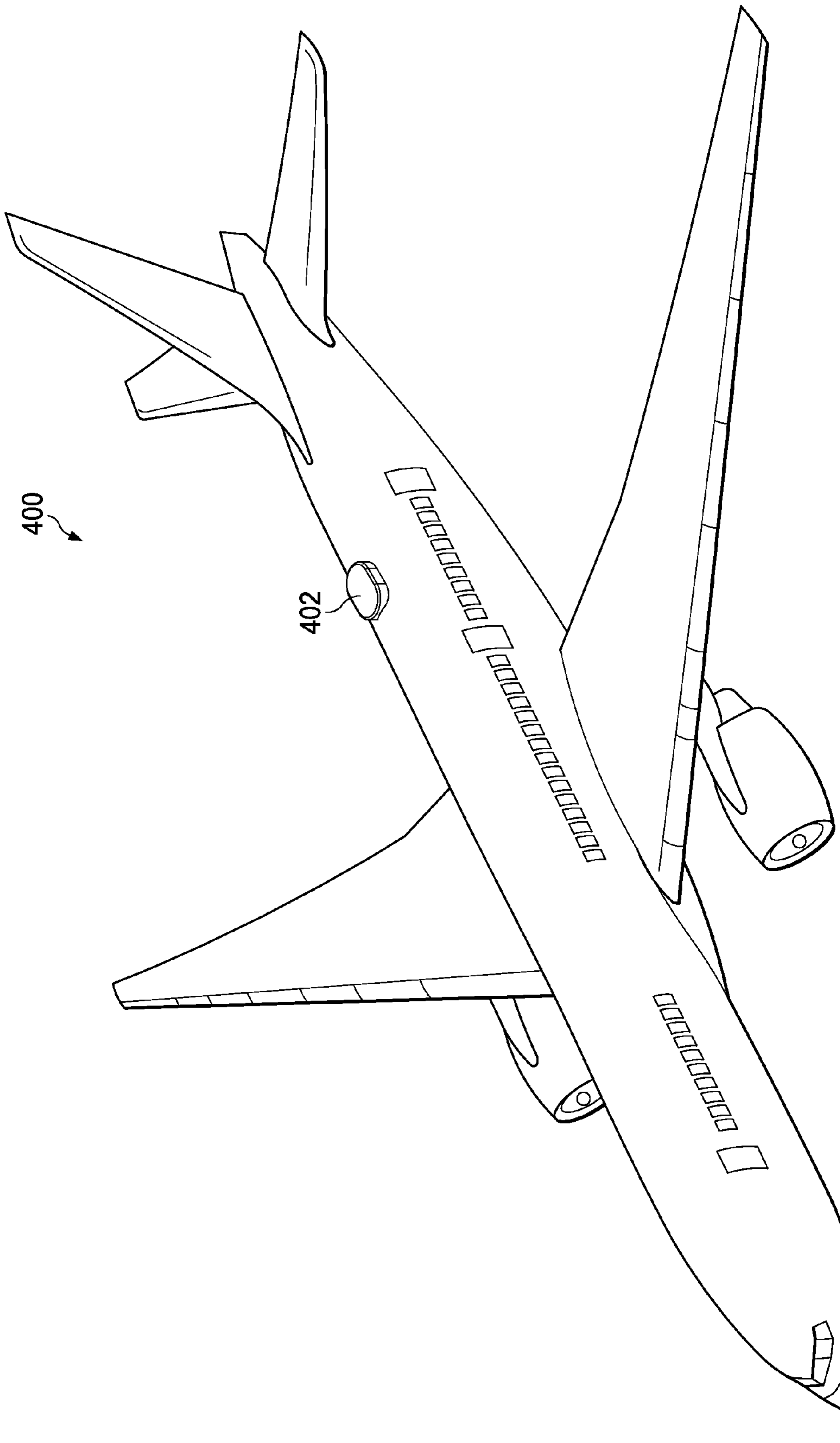


FIG. 4

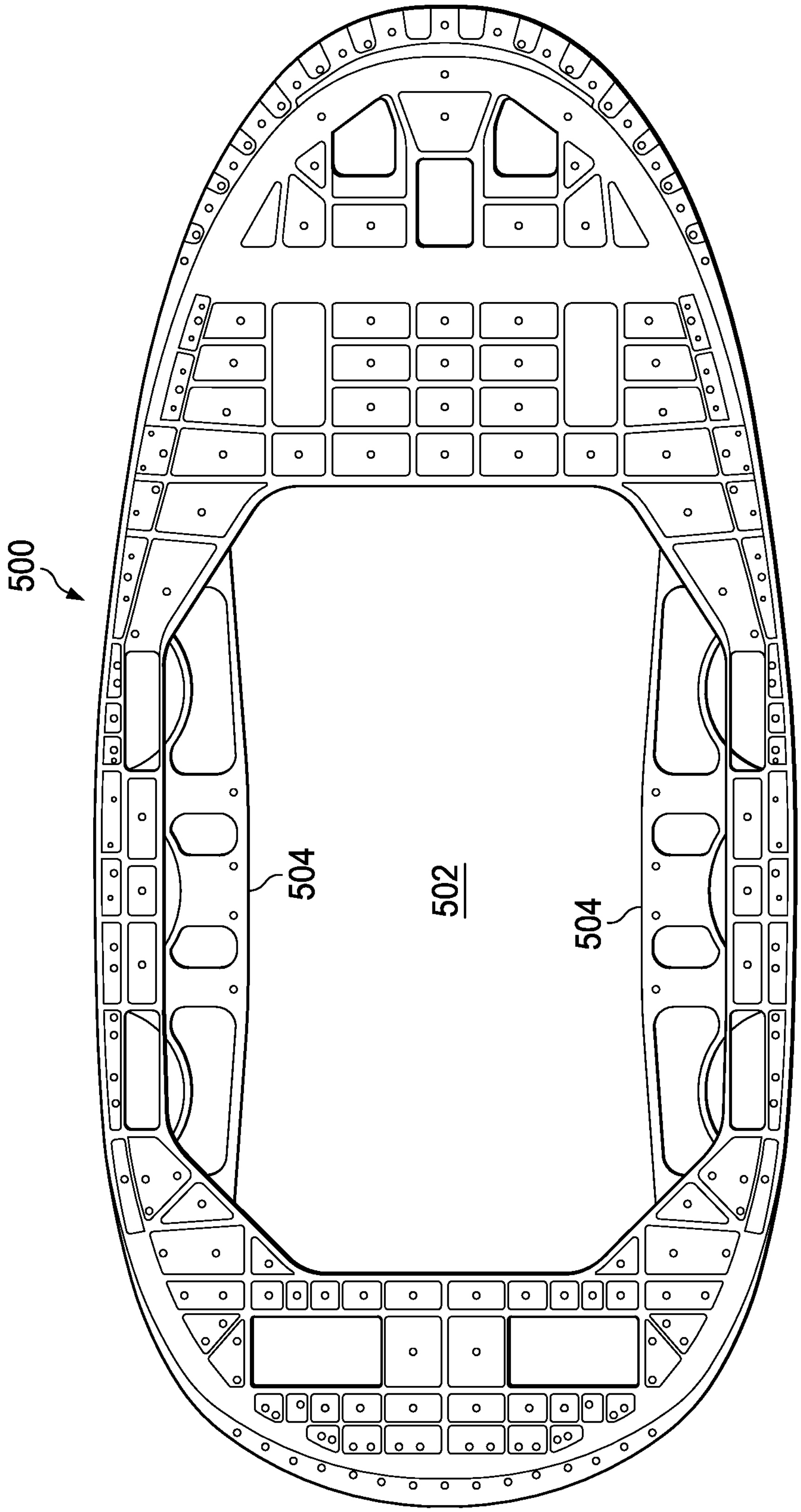


FIG. 5

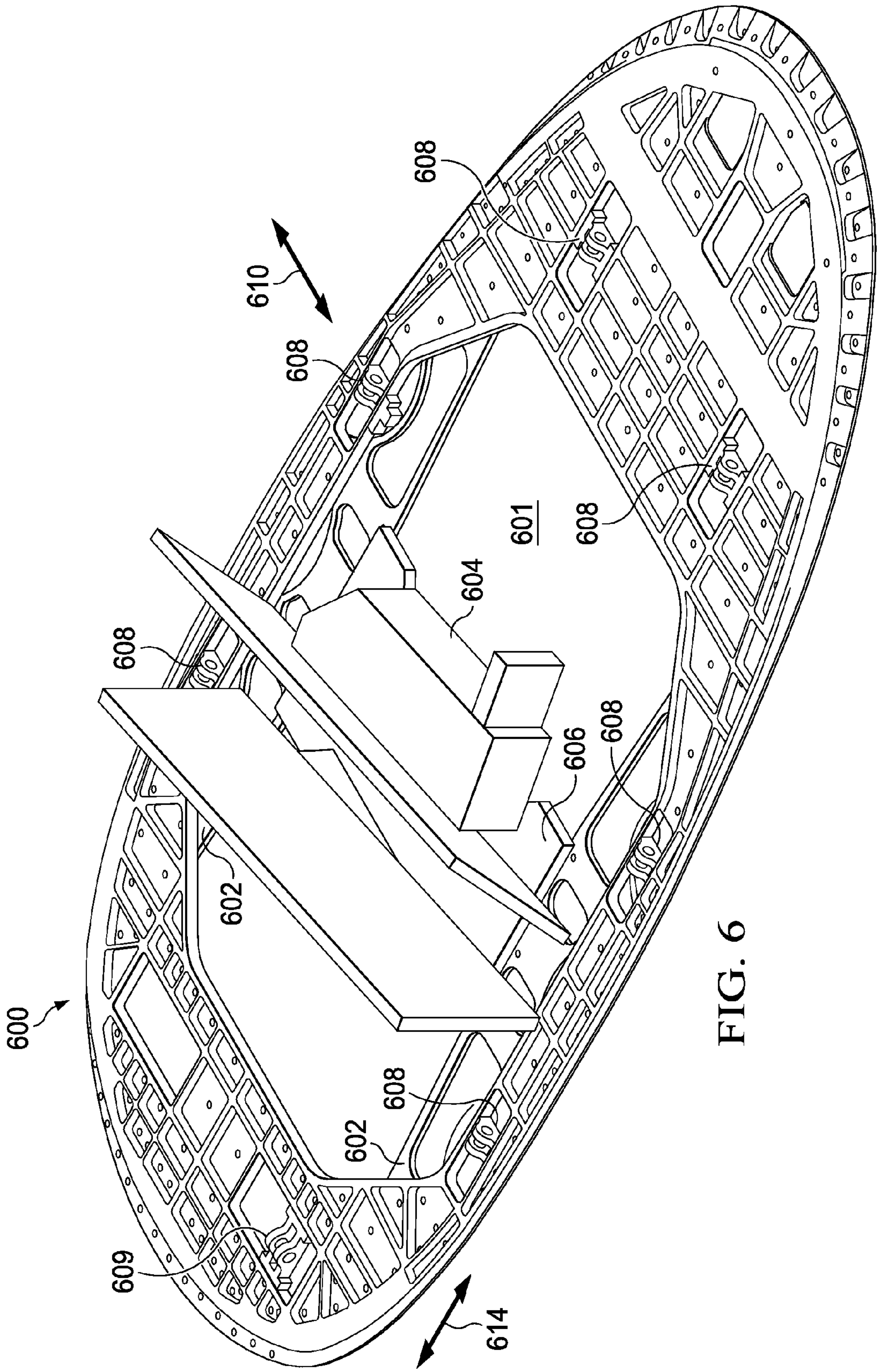


FIG. 6

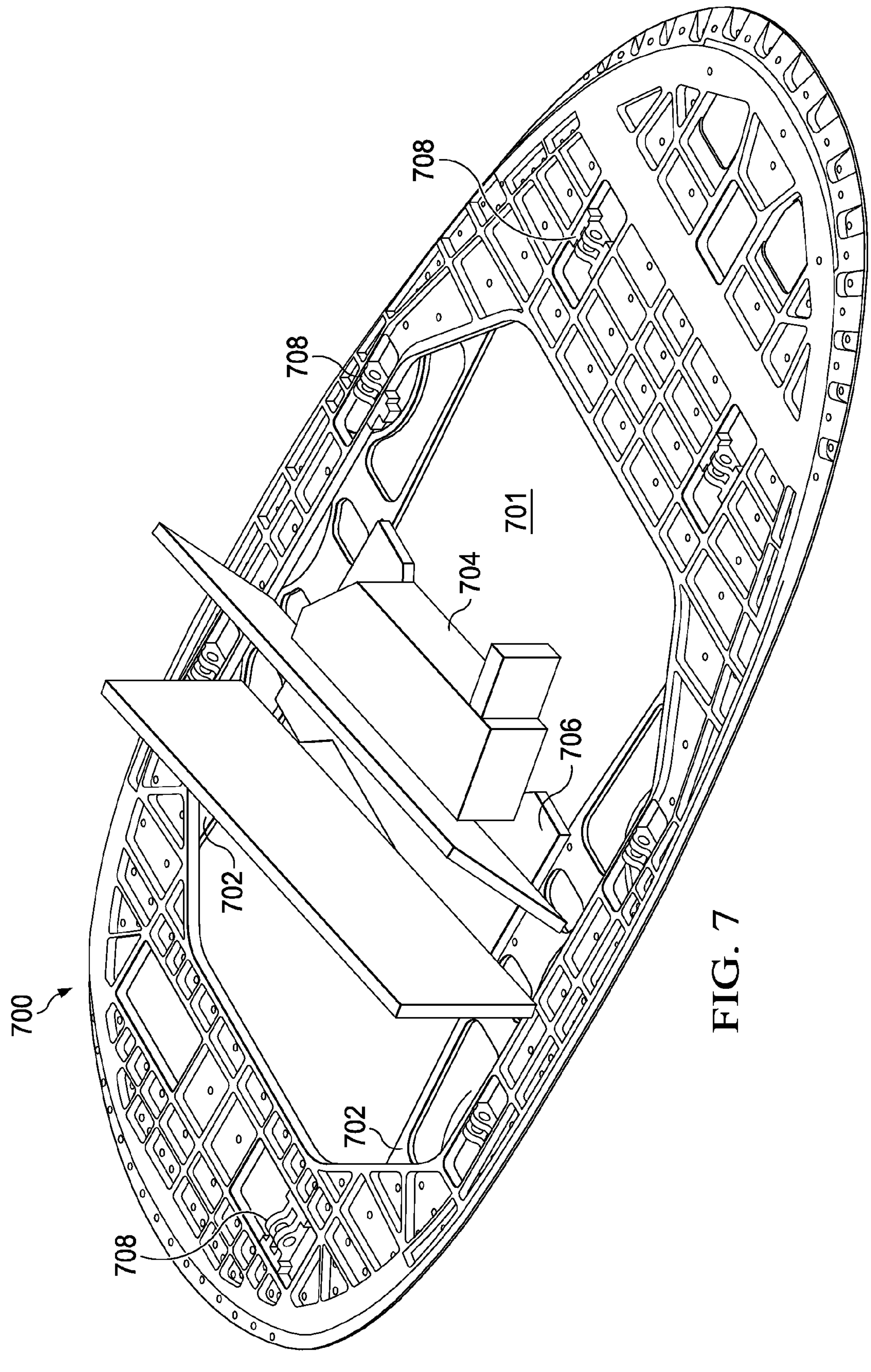


FIG. 7

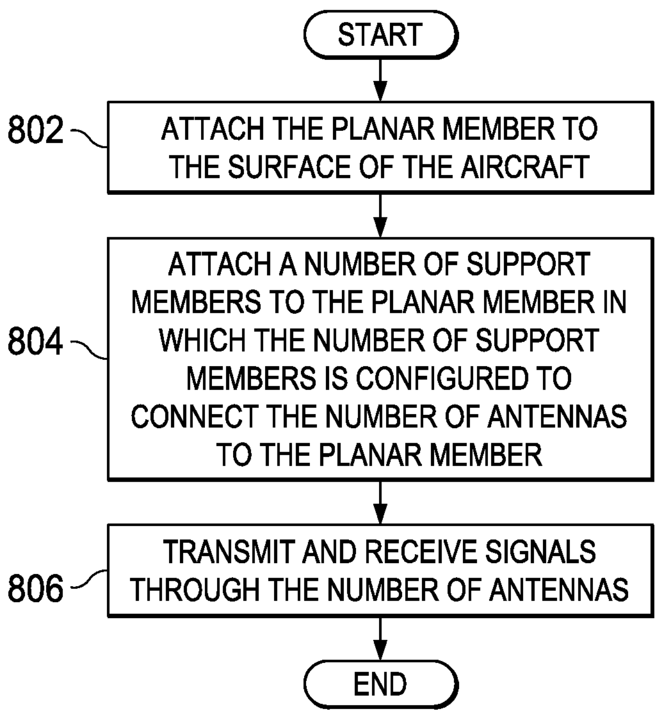

START
802
ATTACH THE PLANAR MEMBER TO THE SURFACE OF THE AIRCRAFT
804
ATTACH A NUMBER OF SUPPORT MEMBERS TO THE PLANAR MEMBER IN WHICH THE NUMBER OF SUPPORT MEMBERS IS CONFIGURED TO CONNECT THE NUMBER OF ANTENNAS TO THE PLANAR MEMBER
806
TRANSMIT AND RECEIVE SIGNALS THROUGH THE NUMBER OF ANTENNAS
END

FIG. 8

ANTENNA SUPPORT BRACKET

BACKGROUND INFORMATION

1. Field

The present disclosure relates generally to aircraft radomes and more particularly to radome attachment plates. Still more particularly, the present disclosure provides a method and system for associating an antenna with an aircraft.

2. Background

An antenna is a transducer that may transmit or receive electromagnetic waves. In other words, antennas may convert electromagnetic radiation into electrical current, or vice versa. Antennas may be used in systems such as radio and television broadcasting, point-to-point radio communication, wireless local area networks, cell phones, radar, aircraft communication, and spacecraft communication. Antennas may be employed in air or outer space, but can also be operated under water or through soil and rock.

When used on an aircraft, an antenna may be covered by a radome. A radome may be a structural, weatherproof enclosure that may protect a microwave and/or radar antenna. Radomes are transmissive to antenna radiation, radar, and radiowaves (microwaves). Radomes also may protect the antenna from the environment and may conceal antenna electronic equipment from view. Radomes may be constructed in several shapes depending upon the particular application. The shapes may include, for example, without limitation, spherical, geodesic, planar, and other shapes. When used on an aircraft the radome may also streamline the antenna system in a manner that may reduce drag on the aircraft.

The radome may be attached to an airframe of the aircraft by a radome attachment plate. The attachment of the antenna on the aircraft at an attachment point may result in forces and vibrations that may increase the need and expense for maintenance and further structural support.

Accordingly, it would be advantageous to have a method and apparatus, which takes into account one or more of the issues discussed above, as well as, possibly other issues.

SUMMARY

In one advantageous embodiment, an apparatus may comprise a planar member and a number of support members. The planar member may be configured to be attached to an airframe of an aircraft. The number of support members may be configured to connect the number of antennas and hold the number of antennas in the opening of the planar member.

In another advantageous embodiment, a system for associating a number of antennas with an aircraft may comprise an aircraft with an airframe, a planar member configured to be attached to an airframe of an aircraft, and a number of support members on the planar member. The number of support members may be configured to connect the number of antennas to the planar member.

In yet another advantageous embodiment, a method for associating a number of antennas with an aircraft may comprise a process. The process begins by attaching the planar member to the airframe of an aircraft. The planar member may have an opening configured to receive the number of antennas. The process also attaches a number of support members to the planar member near the opening of the planar member. The number of support members may be configured to connect the number of antennas to the planar member.

In yet another advantageous embodiment, an apparatus may comprise an aircraft with an airframe, a planar member configured to be attached to the airframe of the aircraft, a

number of support members on the planar member, a number of connectors configured to attach the planar member to the airframe of the aircraft, and a number of antennas configured to receive and transmit signals. The planar member may have an opening configured to receive the number of antennas. The number of support members may be configured to connect the number of antennas to the planar member. The number of support members may be fastened to the planar member. The number of support members may be configured to reduce contact of the number of antennas to the airframe of the aircraft. The connectors may be configured to reduce a change in a shape of the planar member in response to a change in the shape of the airframe of the aircraft.

In yet another advantageous embodiment, a system for associating a number of antennas with an aircraft may comprise an aircraft with an airframe, a planar member configured to be attached to an airframe of an aircraft, a number of support members on the planar member, a number of connectors configured to attach the planar member to the airframe of the aircraft, and the number of antennas configured to receive and transmit signals. The planar member may have an opening configured to receive the number of antennas. The number of support members may be configured to connect the number, of antennas to the planar member. The number of support members may be fastened to the planar member. The number of support members may be configured to reduce the contact of the number of antennas to the airframe of the aircraft. The connectors may be configured to reduce a change in a shape of the planar member in response to a change in the shape of the airframe of the aircraft.

In yet another advantageous embodiment, a method for associating a number of antennas with an aircraft may comprise a process. The process begins by attaching the planar member to the airframe of an aircraft in which the planar member has an opening configured to receive the number of antennas. The process may also attach a number of support members to the planar member near the opening of the planar member. The number of support members may be configured to connect the number of antennas to the planar member. The number of support members may be configured to reduce contact of the number of antennas to the airframe of the aircraft. The process may also attach the planar member to the airframe of the aircraft using a number of connectors configured to reduce a change in a shape of the planar member in response to a change in a shape of the airframe of the aircraft. The process may also transmit and receive signals through the number of antennas.

The features, functions, and advantages can be achieved independently in various embodiments of the present disclosure or may be combined in yet other embodiments in which further details can be seen with reference to the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the advantageous embodiments are set forth in the appended claims. The advantageous embodiments, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an advantageous embodiment of the present disclosure when read in conjunction with the accompanying drawings, wherein:

FIG. **1** is an illustration of an aircraft manufacturing and service method depicted in which an advantageous embodiment may be implemented;

FIG. **2** is an illustration of an aircraft depicted in accordance with an advantageous embodiment;

FIG. **3** is an illustration of a block diagram of an antenna environment depicted in accordance with an advantageous embodiment;

FIG. **4** is an illustration of an aircraft depicted in accordance with an advantageous embodiment;

FIG. **5** is an illustration of a radome attachment plate depicted in accordance with an advantageous embodiment;

FIG. **6** is an illustration of an antenna attached to a number of support members depicted in accordance with an advantageous embodiment;

FIG. **7** is an illustration of an antenna attached to a number of support members as part of a planar member depicted in accordance with an advantageous embodiment; and

FIG. **8** is an illustration of a flowchart illustrating a process for associating an antenna with an aircraft depicted in accordance with an advantageous embodiment.

DETAILED DESCRIPTION

Referring more particularly to the drawings, embodiments of the disclosure may be described in the context of aircraft manufacturing and service method **100** as shown in FIG. **1** and aircraft **200** as shown in FIG. **2**. Turning first to FIG. **1**, an illustration of an aircraft manufacturing and service method is depicted in accordance with an advantageous embodiment. During pre-production, aircraft manufacturing and service method **100** may include specification and design **102** of aircraft **200** in FIG. **2** and material procurement **104**.

During production, component and subassembly manufacturing **106** and system integration **108** of aircraft **200** in FIG. **2** takes place. Thereafter, aircraft **200** in FIG. **2** may go through certification and delivery **110** in order to be placed in service **112**. While in service **112** by a customer, aircraft **200** in FIG. **2** is scheduled for routine maintenance and service **114**, which may include modification, reconfiguration, refurbishment, and other maintenance or service.

Each of the processes of aircraft manufacturing and service method **100** may be performed or carried out by a system integrator, a third party, and/or an operator. In these examples, the operator may be a customer. For the purposes of this description, a system integrator may include, without limitation, any number of aircraft manufacturers and major-system subcontractors; a third party may include, without limitation, any number of venders, subcontractors, and suppliers; and an operator may be an airline, leasing company, military entity, service organization, and so on.

With reference now to FIG. **2**, an illustration of an aircraft is depicted in which an advantageous embodiment may be implemented. In this example, aircraft **200** may be produced by aircraft manufacturing and service method **100** in FIG. **1** and may include airframe **202** with a plurality of systems **204**, interior **206**, and antenna system **207**. Antenna system **207** may be attached to airframe **202**. Examples of systems **204** include one or more of propulsion system **208**, electrical system **210**, hydraulic system **212**, and environmental system **214**. Any number of other systems may be included. Although an aerospace example is shown, different advantageous embodiments may be applied to other industries, such as the automotive industry.

Apparatus and methods embodied herein may be employed during at least one of the stages of aircraft manufacturing and service method **100** in FIG. **1**. As used herein, the phrase "at least one of", when used with a list of items, means that different combinations of one or more of the listed items may be used and only one of each item in the list may be needed. For example, "at least one of item A, item B, and item C" may include, for example, without limitation, item A or item A and item B. This example also may include item A, item B, and item C or item B and item C.

In one illustrative example, components or subassemblies produced in component and subassembly manufacturing **106** in FIG. **1** may be fabricated or manufactured in a manner similar to components or subassemblies produced while aircraft **200** is in service **112** in FIG. **1**. As yet another example, a number of apparatus embodiments, method embodiments, or a combination thereof may be utilized during production stages, such as component and subassembly manufacturing **106** and system integration **108** in FIG. **1**. A number, when referring to items, means one or more items. For example, a number of apparatus embodiments is one or more apparatus embodiments. A number of apparatus embodiments, method embodiments, or a combination thereof may be utilized while aircraft **200** is in service **112** and/or during maintenance and service **114** in FIG. **1**. The use of a number of the different advantageous embodiments may substantially expedite the assembly of and/or reduce the cost of aircraft **200**.

The different advantageous embodiments recognize and take into account a number of different considerations. For example, without limitation, the different advantageous embodiments recognize and take into account that current antennas are attached to an airframe of an aircraft. Attaching the antenna to the airframe of the aircraft may create a hard point. A hard point may be a part of the aircraft airframe that may not expand and contract much with changing atmospheric pressures relative to other parts of the aircraft. Hard points may be reinforced which costs time, money, and weight.

Thus, the different advantageous embodiments provide a method and apparatus comprising a planar member and a number of support members. The planar member may be configured to be attached to an airframe of an aircraft. The number of support members may be attached to the planar member. The number of support members may be configured to connect a number of antennas to the planar member.

Turning to FIG. **3**, a block diagram of an antenna environment is depicted in accordance with an advantageous embodiment. Antenna environment **300** may be implemented in a component such as aircraft **200** in FIG. **2**, for example.

Antenna environment **300** may be any type of environment where an antenna is used. For example, antenna environment **300** may include antenna system **302** and aircraft **304**. Antenna system **302** may be one example of an implementation of antenna system **207** in FIG. **2**. Aircraft **304** may be an example of one implementation of aircraft **200** in FIG. **2**. Antenna system may be used while in service **112** in FIG. **1**.

Aircraft **304** may be a commercial aircraft, passenger aircraft, business aircraft, unmanned aircraft, or some other type of vehicle. Aircraft **304** may comprise airframe **306**. In this illustrative example, airframe **306** may be the fuselage of aircraft **304**. Airframe **306** may have an interior surface exposed to passengers and an exterior surface exposed to the atmosphere. Airframe **306** may have number of hard points **307**. Number of hard points **307** may be locations on airframe **306** that are connected to other parts of aircraft **304**.

In this illustrative example, airframe **306** may be affected by pressure **308** of atmosphere **310**. Airframe **306** may expand and contract as pressure **308** changes. The cabin of aircraft **304** may be pressurized at an air pressure equal to that of the atmosphere around 6000 feet to around 8000 feet. When aircraft **304** is above 8000 feet, pressure **308** may be much lower than inside the cabin of aircraft **304**. Shape **312** of airframe **306** may change **314** due to changes in pressure **308**, loads from the weight of aircraft **304** during flight or taxi, thermal conditions, some other type of condition that may cause change **314** in shape **312** of airframe **306**, or a combination of conditions. For example, as aircraft **304** rises higher in atmosphere **310**, pressure **308** exerted on airframe **306** may decrease. As pressure **308** in the exterior of airframe **306** decreases relative to the pressure interior of airframe **306**, change **314** in shape **312** of airframe **306** may occur. Change **314** may be an expansion of shape **312**. As pressure **308** in the exterior of airframe **306** increases relative to the pressure interior of airframe **306**, change **314** may be a contraction of shape **312**.

In this illustrative example, antenna system **302** may include radome **315**, number of antennas **316**, and attachment system **317**. Radome **315** may be an enclosure that protects number of antennas **316**. Radome **315** may be, for example, without limitation, spherical, geodesic, planar, and/or other shapes. Radome **315** may include planar member **318**. Planar member **318** may also be referred to as a radome attachment plate. Planar member **318** may be attached to airframe **306** of aircraft **304** by connectors **320**. Connectors **320** may be, for example, without limitation, swing links, bolts, welds, fasteners, and/or other suitable types of connector.

Swing links may prevent planar member **318** from expanding and/or contracting with airframe **306** beyond a desirable amount. The expansion and/or contraction may be caused by pressure **308**.

For example, if airframe **306** expands, the part of swing links attached to airframe **306** may move with airframe **306**. However, planar member **318** may not experience the forces because the swing links may move and/or absorb at least some movement of airframe **306**. In one or more advantageous embodiments, connectors **320** may allow for change **322** in shape **324** of planar member **318** to be reduced by change **314** in shape **312** of airframe **306**.

In this illustrative example, radome **315** may include opening **326**. Opening **326** may be a middle area of planar member **318** that is exposed to airframe **306** of aircraft **304**. Opening **326** may be configured to receive number of antennas **316**. In different advantageous embodiments, planar member **318** may not have opening **326** and number of antennas **316** may be attached onto planar member **318** directly.

Opening **326** may be different shapes and sizes. For example, opening **326** may be, without limitation, an oval, a sphere, a square, a rectangle, a triangle, and other shapes. In an advantageous embodiment, opening **326** may be larger than number of antennas **316**. In different advantageous embodiments, opening **326** may be of similar size or smaller than number of antennas **316**.

In this illustrative example, planar member **318** also may include support members **328**. In these advantageous embodiments, support members **328** may be brackets that are attached to planar member **318**. Support members may be configured to attach to planar member **318** in, near, below, or above opening **326**. Support members **328** may be configured to attach number of antennas **316** to planar member **318** in, near, below, or above opening **326**. For example, in some illustrative examples, support members **328** may be located above opening **326** and configured to hold number of antennas **316** above opening **326**. In different illustrative examples, support members **328** may be located in opening **326** and configured to hold number of antennas **316** in opening **326**. In other illustrative examples, support members **328** may be located in opening **326** and configured to hold number of antennas **316** above opening **326**. Support members **328** may be fastened, bolted, welded, or attached by some other device to planar member **318**. In different advantageous embodiments, support members **328** may be part of planar member **318** and not attached to planar member **318**.

Number of antennas **316** may be a device used to transmit and receive radar and radio waves. Number of antennas **316** may include transceiver **330**. Transceiver **330** may be a component of number of antennas **316** and may transmit and receive radar and/or radio waves.

The different advantageous embodiments recognize and take into account that existing antenna attachment systems attach the antenna to hard points on the aircraft. The different advantageous embodiments may provide a reduction in the number of hard points on an aircraft. The antenna may not become a hard point because the antenna may be attached to the radome attachment plate and not the airframe of the aircraft. Reducing the number of hard points may reduce weight and complexity of the aircraft by reducing the reinforcements of the hard points. Reducing the number of hard points may also reduce the cost of the aircraft.

The illustration of antenna environment **300** in FIG. **3** is not meant to imply physical or architectural limitations to the manner in which different advantageous embodiments may be implemented. Other components in addition and/or in place of the ones illustrated may be used. Some components may be unnecessary in some advantageous embodiments. Also, the blocks are presented to illustrate some functional components. One or more of these blocks may be combined and/or divided into different blocks when implemented in different advantageous embodiments.

For example, support members **328** may be separate from planar member **318**. In different advantageous embodiments, there may be multiple antennas connected to planar member **318**. In different advantageous embodiments, there may be multiple antennas connected to multiple planar members.

Turning to FIG. **4**, an illustration of an aircraft is depicted in accordance with an advantageous embodiment. Aircraft **400** may be one example of one implementation of aircraft **304** in FIG. **3**. Aircraft **400** may include radome **402**. Radome **402** may be one example of one implementation of radome **315** in FIG. **3**. In these advantageous embodiments, radome **402** appears on top of aircraft **400** near the back of aircraft **400**. However, in different advantageous embodiments, radome **402** may be placed in different spots on aircraft **400** such as, but not limited to, the nose or tail of aircraft **400**.

Turning to FIG. **5**, an illustration of an antenna system is depicted in accordance with an advantageous embodiment. Radome attachment plate **500** may be one example of one implementation of aircraft planar member **318** in FIG. **3**. Radome attachment plate **500** may include opening **502**. Opening **502** may be one example of one implementation of opening **326** in FIG. **3**. In these advantageous embodiments, support members **504** may be attached to radome attachment plate **500** at opening **502**. Support members **504** may be one example of one advantageous embodiment of support members **328** in FIG. **3**.

Turning to FIG. **6**, an illustration of an antenna attached to a number of support members is depicted in accordance with an advantageous embodiment. Radome attachment plate **600** may be one example of one implementation of aircraft planar member **318** in FIG. **3**. Radome attachment plate **600** may include opening **601**. Opening **601** may be one example of one implementation of opening **326** in FIG. **3**. In these advantageous embodiments, support members **602** may be attached to radome attachment plate **600** at opening **601**. Support members **602** may be one example of one implementation of support members **328** in FIG. **3**.

Antenna **604** may be attached to support members **602** by base **606**. Base **606** may be part of antenna **604**. In different advantageous embodiments, antenna **604** may not have a base and may be directly attached to support members **602**. In different advantageous embodiments, base **606** may be larger and directly attach to radome attachment plate **600**.

Connectors **608** and **609** may be one example of one implementation of connectors **320** in FIG. **3**. Connectors **608** and **609** may be swing links. Swing links may allow the connectors to pivot. Pivoting may reduce the forces applied to radome attachment plate **600** by an attached structure, such as an airframe of an aircraft. Connectors **608** and **609** may absorb the forces.

Connectors **608** may pivot in direction **610**. Connectors **609** may pivot in direction **614**. The connectors in this figure may be a representation of what types of connectors may be used and where they may be placed. In different advantageous embodiments, different connectors may be used, more or less connectors may be used, and the connectors may be positioned in different places.

Turning to FIG. **7**, an illustration of an antenna attached to a number of support members as part of a planar member is depicted in accordance with an advantageous embodiment. Radome attachment plate **700** may be one example of an implementation of aircraft planar member **318** in FIG. **3**. Radome attachment plate **700** may include opening **701**. Opening **701** may be one example of one implementation of opening **326** in FIG. **3**. In these advantageous embodiments, support members **702** may be part of radome attachment plate **700** at opening **701**. Support members **702** may be one example of one implementation of support members **328** in FIG. **3**. Support members **702** may be manufactured as part of radome attachment plate **700**.

Antenna **704** may be attached to support members **702** by base **706**. Base **706** may be part of antenna **704**. In different advantageous embodiments, antenna **704** may not have a base and may be directly attached to support members **702**. In different advantageous embodiments, base **706** may be larger and directly attach to radome attachment plate **700**.

Connectors **708** may be one example of one implementation of connectors **320** in FIG. **3**. Connectors **708** may be swing links. Swing links allow the connectors to pivot. Pivoting may reduce the forces applied to radome attachment plate **700** by an attached structure, such as an airframe of an aircraft. Connectors **708** may absorb the forces.

With reference now to FIG. **8**, an illustration of a flowchart illustrating a process for associating an antenna with an aircraft is depicted in accordance with an advantageous embodiment. The process in FIG. **8** may be implemented by a component such as antenna environment **300** in FIG. **3**, for example.

The process may begin by attaching the planar member **318** to the airframe **306** of the aircraft **304** (operation **802**). Operation **802** may comprise the process of attaching the planar member **318** to the airframe **306** of the aircraft **304** using a number of connectors **320** configured to reduce a change **322** in a shape **324** of the planar member **318** in response to a change **314** in a shape **312** of airframe **306** of the aircraft **304**. The planar member **318** may have an opening **326** configured to receive the number of antennas **316**.

The process may also attach a number of support members **328** to the planar member **318** in which the number of support members **328** may be configured to connect the number of antennas **316** to the planar member **318** (operation **804**). The number of support members **328** may be fastened to the planar member **318**.

The number of support members **328** may be configured to reduce contact of the number of antennas **316** to the airframe **306** of the aircraft **304**. Additionally, the number of support members **328** may be configured to reduce a number of hard points. The process may also transmit and receive signals through the number of antennas **316** (operation **806**). Thereafter, the process terminates.

The flowchart and block diagrams in the different depicted embodiments illustrate the architecture, functionality, and operation of some possible implementations of apparatus and methods in different advantageous embodiments. In this regard, each block in the flowchart or block diagrams may represent a module, segment, function, and/or a portion of an operation or step. In some alternative implementations, the function or functions noted in the block may occur out of the order noted in the figures. For example, in some cases, two blocks shown in succession may be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. Also, other blocks may be added in addition to the illustrated blocks in a flowchart or block diagram.

Thus, the different advantageous embodiments provide a method and apparatus comprising a planar member and a number of support members. The planar member may be configured to be attached to an airframe of an aircraft. The number of support members may be attached to the planar member. The number of support members may be configured to connect a number of antennas to the planar member.

The different advantageous embodiments may provide a reduction in the number of hard points on an aircraft. The antenna does not become a hard point because the antenna is attached to the radome attachment plate and not the airframe of the aircraft. Reducing the number of hard points may reduce weight of the aircraft. the weight may be reduced by reducing the reinforcements of the hard points. Reducing the number of hard points also may reduce the cost of the aircraft.

The description of the different advantageous embodiments has been presented for purposes of illustration and description and is not intended to be exhaustive or limited to the embodiments in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. Further, different advantageous embodiments may provide different advantages as compared to other advantageous embodiments.

The embodiment or embodiments selected are chosen and described in order to best explain the principles of the embodiments, the practical application, and to enable others of ordinary skill in the art to understand the disclosure for various embodiments with various modifications as are suited to the particular use contemplated.

What is claimed is:

1. An apparatus comprising:

a planar member configured to be attached to an airframe of an aircraft and having an opening configured to receive a number of antennas;

a number of support members connected to the planar member at the opening, wherein the number of support members is configured to connect the number of antennas to the planar member; and

a number of swing links configured to attach the planar member to the airframe of the aircraft, wherein the swing links are configured to reduce a change in a shape of the planar member in response to a change in a shape of the airframe of the aircraft, and wherein the swing links pivot to reduce a number of forces applied to the planar attachment member by the airframe.

2. The apparatus of claim **1**, wherein the number of support members is configured to reduce contact of the number of antennas to the airframe of the aircraft when the planar member is attached to hard points on the airframe.

3. The apparatus of claim 1 further comprising:

the aircraft with the airframe; and

the number of antennas configured to receive and transmit signals.

4. The apparatus of claim 1, wherein the number of support members is configured such that the number of antennas do not become hard points on the airframe when the planar member is attached to the airframe.

5. The apparatus of claim 1, wherein the number of support members are part of the planar member and not attached to the planar member.

6. The apparatus of claim 1,

wherein the number of antennas do not become a hard point because the antenna is attached to the planar member and not the airframe of the aircraft;

wherein the swing links absorb the forces; and

wherein the planar member is a radome attachment plate.

7. A system for associating a number of antennas with an aircraft comprising:

an aircraft with an airframe;

a planar member configured to be attached to the airframe of the aircraft in which the planar member has an opening configured to receive the number of antennas;

a number of support members in the opening of the planar member in which the number of support members is configured to connect to the number of antennas to the planar member; and

a number of swing links configured to attach the planar member to the airframe of the aircraft, wherein the swing links are configured to reduce a change in a shape of the planar member in response to a change in a shape of the airframe of the aircraft, and wherein the swing links pivot to reduce a number of forces applied to the planar attachment member by the airframe.

8. The system of claim 7, wherein the number of support members is configured such that the number of antennas do not become hard points on the airframe when the planar member is attached to the airframe.

9. The system of claim 7, wherein the number of support members is fastened to the planar member.

10. The system of claim 7, wherein the number of support members is configured to reduce a contact of the number of antennas to the airframe of the aircraft when the planar member is attached to the airframe.

11. The system of claim 7 further comprising:

the number of antennas configured to receive and transmit signals.

12. A method for associating a number of antennas with an aircraft, comprising:

attaching a planar member to an airframe of an aircraft, wherein the planar member has an opening configured to receive the number of antennas;

attaching a number of support members to the planar member at the opening, wherein the number of support members is configured to connect the number of antennas to the planar member; and

attaching the planar member to the airframe of the aircraft using a number of swing links configured to reduce a change in a shape of the planar member in response to a change in a shape of the airframe of the aircraft, wherein the swing links pivot to reduce a number of forces applied to the planar attachment member by the airframe.

13. The method of claim 12, wherein the number of support members is configured such that the number of antennas do not become hard points on the airframe when the planar member is attached to the airframe.

14. The method of claim 12 further comprising:

transmitting and receiving signals through the number of antennas.

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